PATENT SPECIFICATION (11) 1 276 496

1 276 496

DRAWINGS ATTACHED

(21) Application No. 32237/68 (22) Filed 5 July 1968

(23) Complete Specification filed 29 July 1969

(45) Complete Specification published 1 June 1972

(51) International Classification A24B 3/18

(52) Index at acceptance
A2C 12D 12H
H1N 330 355 360 367 616 650 703
H5H 2C2X 3C 3S

(72) Inventors RONALD ERNEST PROUSE and CHARLES WILKINSON BREEKS HOWE

(54) A METHOD OF TREATING TOBACCO

(71) We, CARRERAS LIMITED, a Company organised under the Laws of Great Britain, of Christopher Martin Road, Basildon, Essex, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method and apparatus for treating tobacco which is to be used in smoking products such as cigarettes, cigars and the like and such products will be referred to herein as tobacco products, by subjecting the tobacco or products to a high frequency electric field.

It has been found that if the high frequency electric field is caused to pulsate a more economic use is made of the equipment and more efficient use is made of the high frequency energy available for both moisture removal and cellular expansion.

According to the present invention therefore a method of treating tobacco to cause the cellular structure of the tobacco to expand and/or to cause the fibres to move apart from one another, which includes passing it through a high frequency electric field produced by a high frequency current which is pulsed on and off.

Conveniently the tobacco may be submitted to a high frequency field by placing it between two metal plates or electrodes, between which it acts as a dielectric.

The invention also includes a tobacco product which has been made up and subjected to the method and also to a tobacco product made from tobacco which has been treated in the manner set forth.

When the supporting device is provided by a conveyor this may include a travelling band made from a material having a low dielectric loss factor, for example, woven "Terylene" (Trade Mark).

[*Price 25p*]

In one convenient arrangement the pulsating high frequency field is provided by two spaced metal plates or electrodes between which the support device is located.

The high frequency current may be pulsed on and off by a timing device which includes means for interrupting the magnetic field between a fixed magnet and a switching device which can conveniently be in the form of a reed switch.

With this arrangement the means for interrupting the field may comprise an interrupter having one or more arms which move between the fixed magnet and the switching device when the interrupter is rotated.

In a preferred arrangement the interrupter is rotated by a synchronous geared electric motor.

In any case, the switching device is preferably connected to a relay and grid switching unit which controls the current to a high frequency generator by means of which the high frequency electric field is produced.

The invention may be performed in many ways but one embodiment will now be described by way of example and with reference to the accompanying drawings, in which:—

Figure 1 is a diagrammatic illustration of an embodiment of the invention,

Figure 2 is a perspective view of the interrupter apparatus,

Figure 3 and Figure 4 are alternative forms of interrupter apparatus,

Figure 5 is a graph showing the anode current profile before cycling, to provide a pulsating current, and

Figure 6 is a graph showing the anode current profile when it is caused to pulsate.

In the arrangement to be described and as shown in the drawings the tobacco is treated prior to its being made up into the final product and may be in the form of whole leaf, threshed leaf, mid rib stem or a mixture of

all these or in the form of cut rag prior to its being used as a filler material for a tobacco product.

The tobacco 4 is delivered onto a conveyor 3, the travelling band of which is made from a material that has a low dielectric loss factor, for example, woven "Terylene" which is the registered Trade Mark for a material made by I.C.I. Fibres Limited. The conveyor is arranged to pass between a fixed electrode 1 and an adjustable plate electrode 2 and the apparatus can be used so that the method is applied to either a static load of tobacco which is placed on the conveyor and moved into position or the conveyor could be continuously moving and the load of tobacco applied to is as a stream. It will be appreciated that if it was merely intended to use a static load of tobacco then the conveyor may not be necessary.

The measure of tobacco being treated between the plates 1 and 2 decides the size of the generator and power required to effect the treatment using the tobacco as the dielectric. The moisture content of the tobacco also has an effect on the desired treatment and the main factors governing a successful treatment are, the physical dimensions of the equipment, the moisture content treatment, the amount of moisture required to be removed, the time allowed for the tobacco between the electrodes, the frequency used and the voltage of the high frequencies source. All these factors govern the power of the generator required.

In any case, the tobacco is preferably exposed to an intense high frequency field for the shortest period of time necessary to achieve the desired effect, that is, to cause the cellular structure of the tobacco to expand or to cause its fibres to move apart from one another. The phenomenon is characterised by quick volatilisation of the moisture contained within the cells or resident between the fibre structures. In addition to this the passage of moisture from within the tobacco causes some of the water-soluble constituents to be carried out to the surface of the tobacco being treated. Once on the surface, rapid cooling causes these constituents to solidify and in so doing form a crust. This imparts a firmness, for example, to cut rag giving it a harder and more permanent curl and thereby increasing its filler power. In addition the rapid expulsion of moisture from within the plant cells or from between fibres causes an expansion to occur and also increases its filling power.

In the arrangement being described the high frequency current is pulsed on and off at predetermined intervals by the use of a timer and relay system.

The pulsing on and off of the high frequency current enables higher power concentration to be used before the treatment equipment becomes electrically overloaded. In this way a more efficient use is made of the high frequency field available for both moisture removal and cellular expansion. For example, the pulsing of the high frequency current can be arranged for predetermined cycle times so that it can be switched on and off for periods found most desirable for the type of tobacco being treated.

In the apparatus being described the switching cycle is provided by a device as shown in Figure 2 which comprises an interrupter 6 which passes through the magnetic field passing between a fixed magnet 7 and a suitable reed switch 8. The reed switch 8 is directly connected to a suitable relay and grid switching unit (not shown) which in turn controls the main flow of current to the high frequency generator, (not shown). The interrupter 6 is formed by a cruciform shaped piece of metal which thus provides four arms 9 and which is fixed to the output shaft 10 of a synchronous geared electric motor 11 so that rotation of the motor shaft 10 causes the arms 9 of the cruciform to pass between the magnetic field as required.

It will be appreciated that the interrupter could be provided with any number of arms as desired and Figure 3 shows a construction employing a single bar shaped member 12 the centre of which is fastened to the drive shaft 10. In another arrangement as shown in Figure 4 a member 13 having three arms 14 suitably displaced from one another by 120° is employed.

With these arrangements the anode current supplied across the electrodes 1 and 2 is delivered in pulses, the length of time of each pulse being greater than the time interval between them and being controlled by the speed of rotation of the motor 11.

Figure 5 is a graph showing the anode current profile when a static switching system is used as opposed to the anode current profile which results when a pulse switching system is used, which is shown in Figure 6.

If desired the conveyor 3 of Figure 1 could be adapted to receive smoking products such as cigarettes the tobacco filling of which is subjected to the treatment after the smoking product is made-up.

It will be appreciated that the other methods of producing the high frequency pulses could be employed if desired, the arrangement described above merely being a simple and convenient construction.

WHAT WE CLAIM IS:—

1. A method of treating tobacco to cause the cellular structure of the tobacco to expand and/or to cause the fibres to move apart from one another which includes passing it through a high frequency electric field produced by a high frequency current which is pulsed on and off.

2. A method of treating tobacco as claimed in Claim 1 in which the tobacco is submitted to the high frequency field by placing it be-

tween two metal plates or electrodes between which it acts as a dielectric.

3. A method of treating tobacco substantially as described herein with reference to and as shown in the accompanying drawings.

4. A tobacco product which has been made-up and subjected to the method claimed in any one of Claims 1 to 3.

5. A tobacco product made from tobacco which has been subjected to the method set forth in any one of Claims 1 to 3.

6. Apparatus when used for carrying out the process set forth in Claim 1 comprising a high frequency electric field electrode system, a device adapted to supporting tobacco or tobacco product to be treated which is arranged within the high frequency field produced by the electrode system, and means for causing the high frequency current supply to be pulsed on and off.

7. Apparatus as claimed in Claim 6 in which the supporting device is a conveyor.

8. Apparatus as claimed in Claim 7 in which the conveyor includes a travelling band made from a material having a low dielectric loss.

9. Apparatus as claimed in Claim 6, Claim 7 or Claim 8 in which the high frequency field is produced by two spaced metal plates or electrodes between which the support device is located.

10. Apparatus as claimed in any one of Claims 6 to 9 in which the high frequency current is pulsed on and off by a timing device which includes means for interrupting the magnetic field between a fixed magnet and a switching device.

11. Apparatus as claimed in Claim 10 in which the switching device is a reed switch.

12. Apparatus as claimed in Claim 6 or Claim 11 in which the means for interrupting the field comprises an interrupter having one or more arms which move between the fixed magnet and the switching device when the interrupter is rotated.

13. Apparatus as claimed in Claim 12 in which the interrupter is rotated by a synchronous geared electric motor.

14. Apparatus as claimed in any one of Claims 10 to 13 in which the switching device is connected to a relay and grid switching unit which controls the current to a high frequency generator by means of which the high frequency field is produced.

15. Apparatus when used for treating tobacco or tobacco products substantially as described herein with reference to and as shown in Figures 1, and 2, Figure 3, Figure 4 and Figure 5 and 6.

For the Applicants,
G. F. REDFERN & CO.,
Southampton House,
317 High Holborn,
London, WC1V 7NG.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1972.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1276496 COMPLETE SPECIFICATION
1 SHEET

FIG. 1.

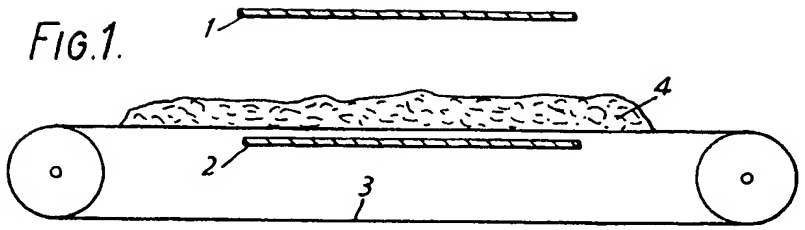

FIG. 2.

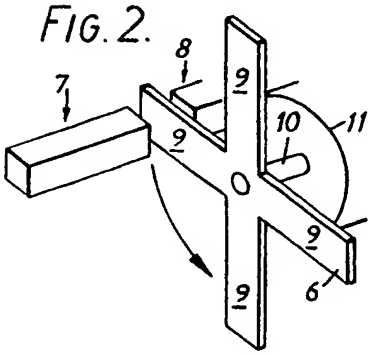

FIG. 3.

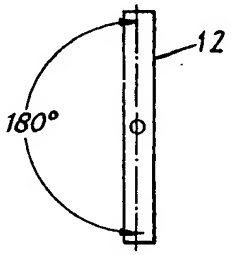

FIG. 4.

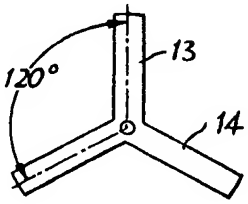

FIG. 5.

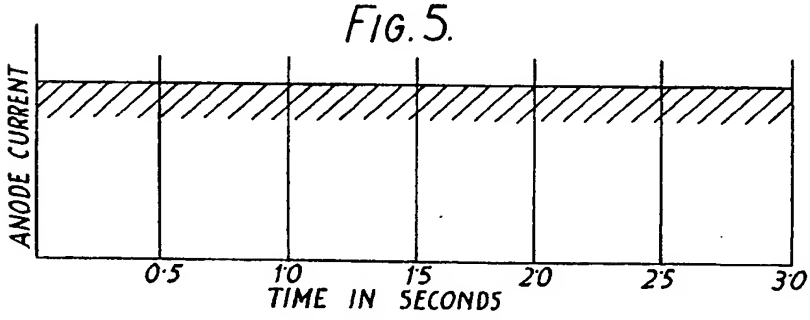

FIG. 6.